DOCUMENT RESUME

ED 405 214 SE 059 803

AUTHOR Tuan, Hsiao-Lin; And Others
TITLE The Development of a Questionnaire for Assessing Student Perception of Teachers' Knowledge in Taiwan and Australia.
PUB DATE Mar 97
NOTE 15p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (70th, Oak Brook, IL, March 21-24, 1997).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Classroom Environment; Constructivism (Learning); Educational Strategies; Foreign Countries; Junior High Schools; Junior High School Students; Knowledge Base for Teaching; Questionnaires; Science Instruction; *Science Teachers; *Student Attitudes; Teacher Education Curriculum; *Teacher Evaluation
IDENTIFIERS Australia; Taiwan

ABSTRACT

The goals of this study were to explore students' perceptions of how teachers' science teaching matched students' understanding and needs levels, report on the development and validation of a questionnaire to probe these perceptions, and compare junior high school students' perceptions from Taiwan and Australia. Descriptions of both the pilot study and the main study are included. Taiwanese students (N=1800) and Australian students (N=500) responded to the questionnaire which employed a conceptual framework of four categories: (1) instructional repertoire; (2) representational repertoire; (3) knowledge of students' understanding; and (4) knowledge of subject matter. Examination of the mean data for these categories indicates that there is little difference between the perceptions of Taiwanese and Australian students about their teachers' knowledge. The instrument is useful for teachers in identifying students' perceptions of their own teaching performance. Contains 18 references. (DDR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

The Development of a Questionnaire for Assessing Student Perception of Teachers' Knowledge in Taiwan and Australia

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY
H-L Tuan
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Hsiao-Lin Tuan, Huey-Por Chang, Kuo-Hua Wang,
National Changhua University of Education, Taiwan

David F. Treagust
Curtin University of Technology, Perth, Australia

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED 405 214

Abstract

Pedagogical content knowledge has been an important concept which has influenced both science teacher education programs and research on science teaching during past decade. Based on Shulman's (1986) definition, teachers have to know the content they are teaching and transform their content knowledge in such a manner that it fits their students level of understanding. Research conducted on teachers' pedagogical content knowledge has mainly focused on how to educate teachers about the nature of this knowledge, but few studies have been conducted from students' perceptions on how teachers' science teaching matched their understanding and needs level. Meanwhile, no available instrument was found to examine students' perception of teachers' pedagogical content knowledge. Therefore, the purpose of this study was to report how we developed and validated the questionnaire on students' perceptions of teachers' knowledge in relation to their pedagogy and made comparisons between junior high school students' perceptions from Taiwan and Australia.

The research literature provided several features of pedagogical content knowledge -- these were instructional repertoire, representational repertoire, subject matter knowledge, and knowledge of how to assess students' understanding. Six hundred and thirty four Taiwanese junior high school students participated in a pilot study which provided evidence of high reliability of the scales, a good factor structure, and suggestions to delete weak items. For the main study, under each category, nine to ten items were generated making a total of 37 items. Over 1800 Taiwanese and over 500 Australian junior high school students who varied in grades, genders and ability levels were selected for the study. Reliability and validity of the questionnaire were established based on Cronbach alpha and factor analysis. Data analysis indicated that the overall reliability of the scales of the questionnaire for both groups was very high. An examination of the mean data for the four categories indicate that there is little difference between the perceptions of Taiwanese and Australian students about their teachers' knowledge, with the mean responses for each scale being in the 'sometimes' or 'often' range. The paper concludes with comments about how these data can be used with other learning environment data to investigate any cross-national differences in perceptions of the learning environment.

Keywords: Teachers' knowledge, questionnaire development, pedagogical content knowledge

Paper presented at the annual meeting of the National Association for Research in Science Teaching, Chicago, USA, 21-24, 1997.

SE059603

Introduction

Among the current goals of science teaching, applications of constructivist notions or philosophy into teaching has the ascendancy. These goals are primarily to help learners acquire content knowledge in a meaningful way. Factors enabling learners to construct their knowledge and apply this knowledge in new situations are related to teachers' subject-matter knowledge, pedagogical knowledge, and pedagogical content knowledge. Pedagogical content knowledge has been an important concept which has influenced science teacher education programs and science teaching research during past decade. Based on Shulman's (1986) definition of pedagogical content knowledge, teachers have to know the particular subject matter knowledge they are teaching and represent this subject matter knowledge to students at a level at which it can be understood.

A review of the literature on pedagogical content knowledge (Tuan, 1996) revealed that research mainly focused on identifying the nature and substance of pedagogical content knowledge, examined the difference between expert and novice teachers' pedagogical content knowledge, and identified how to educate pre- and in-service teachers about their pedagogical content knowledge. However, no study looked at pedagogical content knowledge from the student' perceptions. Tuan's review summarized how different researchers captured the substance of pedagogical content knowledge. For instance, Grossman (1988) addressed the importance of curriculum knowledge; Geddis (1993) considered conceptual change teaching strategies as the essence of pedagogical content knowledge; Tamir (1988) addressed the importance of assessment of pedagogical content knowledge; and McDiarmid, Ball, and Anderson (1989) advocated content representation.

According to Reynolds (1992), pedagogical content knowledge consists of teaching methods, content organization, knowledge of students' content learning, content representation, and assessment knowledge. Cochran, DeRuiter and King (1993) used pedagogical content knowing instead of pedagogical content knowledge, inferring that teachers' pedagogical content knowledge is the evolving knowledge of pedagogy, content knowledge, knowledge of students, and knowledge of context. Based on the above researchers' definitions, Tuan(1996) defined pedagogical content knowledge as being integrated in seven domains -- pedagogical knowledge, pedagogical content knowledge representation, subject matter knowledge, curriculum knowledge, assessment knowledge, and context and social knowledge.

In addition to the concept of pedagogical content knowledge, Shulman and his coworkers also provided the framework for a knowledge base of teaching, which included subject matter knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends, purposes and values (Shulman, 1987; Wilson, Shulman, & Richert, 1987). To some extent teachers' knowledge and the substance of pedagogical content knowledge cover similar domains of knowledge, but pedagogical content knowledge is more related to content knowledge.

Of interest in this study and related studies is how teachers' knowledge is related to the learning environment? Fraser and his coworkers (Fraser, Rennie, & Tobin, 1990; Tobin & Fraser, 1989; Tobin, Kahle, & Fraser, 1990) applied both qualitative and quantitative research in investigating how teachers create a higher cognitive learning environment. Research revealed that teachers' metaphors of their roles and their content knowledge influenced students' perception of the classroom learning environment. Fraser (1994) suggested that future researchers could design new classroom learning environments based on the goals of their investigation. Indeed, teachers do hold different teaching knowledge which influences the establishment of different learning environments, especially the educational and social psychological learning environment. In addition, teachers' knowledge would also be influenced by their different cultural backgrounds.

Therefore, the purpose of this study was to report how we used the literature on teachers' pedagogical content knowledge and teachers' knowledge as a framework for conceptualizing the dimensions of a new questionnaire for investigating teachers' knowledge in a cross-cultural study. This paper reports junior high school students' perceptions of teachers' knowledge in two countries, Taiwan and Australia.

Developing the instrument

Several issues were taken into consideration before designing items. First, items should be easy to comprehend for 8th and 9th grade students both in Taiwan and in Australia. Second, each category should be meaningful from students' perspective. Third, the response format should be the same as that used in the common questionnaire -- five response alternatives were almost never, seldom, sometimes, often, and very often.

Based on trials of the instrument with students and interactive communication between researchers in Taiwan and Australia, we changed our conceptual framework of the dimensions of teachers' knowledge from the original seven categories of pedagogical knowledge, pedagogical content knowledge representation, curriculum knowledge, assessment knowledge, student knowledge, content knowledge, contextual knowledge, to Representational Repertoire, Instructional Repertoire, Knowledge of Students' Understanding, and Subject Matter Knowledge. The main problem was that it appeared from the initial data and our deliberations that not all seven categories were distinguishable by the students.

Subsequently, our final definition of the categories were:

- *Instructional repertoire* - which is students' perceptions of the extent to which the teacher selects from among an instructional repertoire.
- *Representational repertoire* - which is students' perceptions of the extent to which the teacher uses a representational repertoire that challenges their previous concepts and which includes analogies, metaphors, examples, etc.
- *Knowledge of students' understanding* - which is students' perceptions of the extent to which the teacher evaluates student understanding during interactive teaching and at the end of lessons and units.
- *Subject-matter knowledge* - which is students' perceptions of the extent to which the teacher demonstrates a comprehension of purposes, subject matter and ideas within the discipline.

After we finalized the four categories in the questionnaire, nine to ten items were generated under each category. These items were translated into Chinese, then translated back by asking a Chinese science educator outside of the research team to translate each item into English. Australian researchers checked the meaning of the back translation in order to decide whether or not the Chinese translation should be revised or the English version should be revised. Back translation was conducted several times until neither the Taiwanese nor the Australian researchers had any questions on the meaning of the items. During these back translation processes, some items were elaborated in order to make items more meaningful for both Taiwanese and Australian students. Examples are listed in the following:

> My teacher uses reference books other than textbooks when teaching us science.

This item was problematic because Australian researchers considered that reference books were extra curricula materials, but the Chinese researchers considered that these books comprised problem solving exercises. Therefore, this item was deleted.

My teacher uses tests that only assess what I have memorized not what I understand.

was changed to

My teacher uses tests to check that I understand what I have learned.

Finally, 37 items were established in the questionnaire; three categories--instructional repertoire, subject matter knowledge and knowledge of students' understanding comprised nine items; the representational repertoire category comprised ten items.

Analysis of Data from the Pilot Study

Six hundreds and thirty four Taiwanese junior high school students from seven junior high schools fifteen classes were selected for the pilot study. Of these 498 were in eighth grade (77.1%) and 145 students(22.9%) were in seventh grade. The sample was divided equally between boys (315) and girls (315). Four students did not list their gender.

After collecting the data, descriptive statistics, internal reliabilities, and factor analyses were conducted in order to check the reliability and validity of the questionnaire. Five students, who were articulate, were interviewed to check whether or not students understood the meaning of the items in the questionnaire.

Analysis of the data (Tuan, Chang, Wang & Treagust, 1997) indicated that the instrument was satisfactory in terms of the statistical indices. The reliabilities of the four categories of the questionnaire were as follows: instructional repertoire - 0.71; representational repertoire - 0.80; subject matter knowledge - 0.82, and students' understanding - 0.85. The construct validity of these four categories was confirmed by factor analysis. Intercorrelation of scales ranged from 0.24 to 0.56 with four of the six intercorrelations above 0.50. Internal consistency, discriminate validity ranged form 0.38 to 0.52 indicating that each scale is independent.

Based on the data analysis, we found the following items (5, 9, 12, 15, 16, 19, and 23) to be problematic items:

5. My teacher uses the same procedure to teach different topics.
9. My teacher's lessons are always the same.
12. My teacher uses demonstrations to show science concepts.

15. My teacher uses appropriate models to help me understand science concepts.

16. My teacher shows us activities that I can use to continue my study of a topic.

19. My teacher uses appropriate videotapes to explain science concepts.

23. My teacher cannot answer our questions about science concepts.

The factor loading value of item 5 in factor one (instructional repertoire) was 0.27, and its correlation with the total instrument was only 0.10. Students' interview results showed that students did not understand the meaning of teaching procedures:

Student A: Teaching procedures are steps of teaching activities, such as lab, lecture, etc.

Student B: It is using different methods teaches different topics.

Student C: It is the repetition of the same procedures or steps.

Student D: Since all the chapters are different, therefore, the teaching procedures are different.

The factor loading of Item 9 was only 0.003 on factor one and its correlation with the total items was only 0.09. When interviewed, students could not understand the difference between lessons and teaching methods. They also thought curriculum is the same as the covered content in the class. Based on the above results, we decided to delete items 5 and 9 from the questionnaire.

Item 12 had high loading on two factors, factors one (0.36) and four (0.39), with a correlation with the total questionnaire of 0.49 and with scale four is 0.58. Based on interviews, students could understand what demonstration were. We thought this item is very important, but that its meaning belonged more to the representational repertoire category. Therefore, we revised the phrase to make the meaning of the item more toward to representation. The revised item is "My teacher explains science concepts using demonstrations".

Both items 15 and 16 had higher loading values on factor one (0.32, 0.60) than on factor four (0.13, -0.02) as we original planned. However, their correlation with total items were reasonable (0.31, 0.38). Therefore, we decided to move these two items from the representational repertoire to the instructional repertoire category.

The factor loading of Item 19 was more on factor one (instructional repertoire) (0.33) than on factor four (representational repertoire) (-0.04), and its correlation with representational repertoire category was 0.25. However, reading the meaning of this item, we still considered that it belonged to the representational repertoire. In the final version of the questionnaire, we revised the item as "My teacher explains scientific concepts using videotapes".

The factor loading of Item 23 was on factor two (Subject-matter knowledge); however, it's correlation with total items and subject-matter knowledge category were quite low (0.14, 0.27). In interviewing students, they all thought their teachers were very competent in their subject matter knowledge. However, we believe that this is still a good item to assess teachers' subject matter knowledge, therefore, we have kept this item for the final version (see Appendix I).

Analysis of Data from the Main Study

The final instrument consisting of nine to ten items per category, making a total of 37 items, was administered to over 1800 Taiwanese and over 500 Australian junior high school students who varied in grades, genders and ability levels were selected for the study. Descriptive statistics are shown in Table 1.

Table 1: Descriptive statistics for the four categories of the instrument to measure students' perceptions of teachers' knowledge

Category	# Ss	Mean	SD	Reliability
Instructional Repertoire (Taiwan)	1841	30.01	8.38	0.90
Instructional Repertoire (Australia)	514	28.88	7.42	0.90
Representational Repertoire (Taiwan)	1840	31.04	7.25	0.87
Representational Repertoire (Aust)	504	30.54	6.57	0.86
Know. of Student Understanding (Taiwan)	1834	34.30	7.08	0.88
Know. of Student Understanding (Aust)	509	33.15	6.64	0.90
Subject Matter Knowledge (Taiwan)	1807	33.61	6.32	0.75
Subject Matter Knowledge (Aust)	505	35.95	6.24	0.84

Reliabilities and Item-to-scale correlations

The scales for each category for both Taiwanese and Australian student groups had high values of Cronbach alpha reliabilities indicating that the scales were a reliable measure of the categories of teachers' knowledge being investigated. In addition, the scales themselves proved to be consistent with only a small number of items having less than .30 in item to scale correlations.

All but one of the item-total correlations for the category Instructional Repertoire for both Taiwanese and Australian students was in the range of .55-.79. The lowest correlation being .36 and .47 respectively for item 1, 'My teacher divides the class into groups for teaching activities'.

Similar results applied to the item to scale correlations for the items in the category Representational Repertoire, with item 9, 'My teacher explains scientific concepts using videotapes' having item - scale correlations of .20 and .27 respectively.

Item to scale correlations for the category Subject Matter Knowledge were satisfactory with the exception of item 4 'My teacher cannot answer our questions about science concepts', and item 9, 'My teacher does not know the content (s)he is teaching, which had item to scale correlations less than .37.

All items in the category Knowledge of Students' Understanding had acceptable item to scale correlations.

Responses to categories

For the category Representational Repertoire, the student mean response for Taiwanese and Australian students was 3.33 and 3.21 respectively indicating that the events that these items were investigating occur more than 'sometimes'.

For the category Instructional Repertoire, the student mean response for Taiwanese and Australian students was 3.54 and 3.39 respectively indicating that the events that these items were investigating occur between 'sometimes' and 'often'.

For the category Knowledge of Student Understanding, the student mean response for Taiwanese and Australian students was 3.81 and 3.68 respectively indicating that the events that these items were investigating occur 'often'.

For the category Subject Matter Knowledge, the student mean response for Taiwanese and Australian students was 3.73 and 3.99 respectively indicating that the events that these items were investigating occur 'often'.

An examination of the mean data for the four categories indicate that there is little difference between the perceptions of Taiwanese and Australian students about their teachers' knowledge.

Concluding Comments

Based on the results of this questionnaire, we believe that it can be used help teachers identify students' perceptions on their own science teaching performance. By examining the results, researchers and teachers will have information about those issues of their teaching that can be to improved in order to match students' needs and expectations. The uniqueness of this questionnaire is that it is specifically related to teachers' knowledge within the teaching and learning environment that they construct. However, future research is needed to provide more specific analysis concerning the relationship between this questionnaire with the other data from learning environment instruments.

References

Cochran, K. F., DeRuiter, J. A., & King, R. A. (1993). Pedagogical content knowing: an integrative model for teacher preparation. *Journal of Teacher Education, 44*(4), 263-272.

Fraser, B. J. (1986). *Classroom environment.* London: Croom Helm.

Fraser, B. J. (1994). Research classroom and school climate. In Gabel, D. L. (Ed.). *Handbook of research on science teaching and learning* (pp. 493-541). New York: Macmillan Publishing Company.

Fraser, B. J., Rennie, L. J., & Tobin, K. (1990). The learning environment as a focus in a study of higher-level cognitive learning. *International Journal of Science Education, 12*, 531-548.

Geddis, A. N. (1993). Transforming subject-matter knowledge: the role of pedagogical content knowledge in learning to reflect on teaching. *International Journal of Science Education, 15*(6), 673-683.

Grossman, P. L.(1988). *A study in contrast: Source of pedagogical content knowledge for secondary English teacher.* Unpublished doctoral dissertation. Stanford University, Stanford.

McDiarmid, G. W., Ball, D. L., & Anderson, C. W. (1989). Why staying one chapter ahead doesn't really work: Subject-specific pedagogy. In Reynolds, M. C. (Ed.), *Knowledge base for the beginning teacher* (pp. 185-192). Oxford: Pergamon.

Reynolds, A. (1992). What is competent beginning teaching? A review of the literature. *Review of Educational Research, 62*(1), 1-35.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(1), 4-14.

Shulman, L. S. & Sykes, G. (1986). *A national board for teaching? In search of a bold standard*. A paper prepared for the Task Force on Teaching as a Profession. Carnegie Forum on Education and the Economy, Stanford, California.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform: *Harvard Educational Review, 57*(1), 1-22.

Tamir, P. (1988). Subject matter knowledge and related pedagogical knowledge in teacher education. *Teaching and Teacher Education, 4*, 99-110.

Taylor, P. C. & Fraser, B. J. (1991, April). *Development of an instrument for assessing constructivist learning environments.* Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Tobin, K., Kahle, J. B., & Fraser, B. J. (1990). *Windows into science classes: Problems associated with higher level cognitive learning*. London: Falmer.

Tobin, K, & Fraser, B. J. (1989). Barriers to higher cognitive learning in high school science. *Science Education, 73*, 659-682.

Tuan, H. L. (1996). Pedagogical content knowledge -- a revelation for the reform of future science teacher education. *Proceedings of the First Math and Science Teaching and Teacher Education conference* (pp. 118-143).

Tuan, H. L., Chang, H-P., Wang, K-H, & Treagust, D. F. (1997, January). *The development of a questionnaire for assessing student perceptions of teachers knowledge in Taiwan and Australia: A pilot study.* Paper presented at the International Conference on Science, Mathematics and Technology Education, Hanoi, Vietnam.

Wilson, S., Shulman, L. S., & Richert, A. (1987). "150 different ways of knowing" Representations of knowledge in teaching. In J. Calderhead (Ed.), *Exploring teacher thinking*. Sussex, England: Holt, Rinehart & Winston.

For the category Subject Matter Knowledge, the student mean response for Taiwanese and Australian students was 3.73 and 3.99 respectively indicating that the events that these items were investigating occur 'often'.

An examination of the mean data for the four categories indicate that there is little difference between the perceptions of Taiwanese and Australian students about their teachers' knowledge.

Concluding Comments

Based on the results of this questionnaire, we believe that it can be used help teachers identify students' perceptions on their own science teaching performance. By examining the results, researchers and teachers will have information about those issues of their teaching that can be to improved in order to match students' needs and expectations. The uniqueness of this questionnaire is that it is specifically related to teachers' knowledge within the teaching and learning environment that they construct. However, future research is needed to provide more specific analysis concerning the relationship between this questionnaire with the other data from learning environment instruments.

References

Cochran, K. F., DeRuiter, J. A., & King, R. A. (1993). Pedagogical content knowing: an integrative model for teacher preparation. *Journal of Teacher Education, 44*(4), 263-272.

Fraser, B. J. (1986). *Classroom environment.* London: Croom Helm.

Fraser, B. J. (1994). Research classroom and school climate. In Gabel, D. L. (Ed.). *Handbook of research on science teaching and learning* (pp. 493-541). New York: Macmillan Publishing Company.

Fraser, B. J., Rennie, L. J., & Tobin, K. (1990). The learning environment as a focus in a study of higher-level cognitive learning. *International Journal of Science Education, 12*, 531-548.

Geddis, A. N. (1993). Transforming subject-matter knowledge: the role of pedagogical content knowledge in learning to reflect on teaching. *International Journal of Science Education, 15*(6), 673-683.

Grossman, P. L.(1988). *A study in contrast: Source of pedagogical content knowledge for secondary English teacher.* Unpublished doctoral dissertation. Stanford University, Stanford.

McDiarmid, G. W., Ball, D. L., & Anderson, C. W. (1989). Why staying one chapter ahead doesn't really work: Subject-specific pedagogy. In Reynolds, M. C. (Ed.), *Knowledge base for the beginning teacher* (pp. 185-192). Oxford: Pergamon.

Reynolds, A. (1992). What is competent beginning teaching? A review of the literature. *Review of Educational Research, 62*(1), 1-35.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(1), 4-14.

Shulman, L. S. & Sykes, G. (1986). *A national board for teaching? In search of a bold standard*. A paper prepared for the Task Force on Teaching as a Profession. Carnegie Forum on Education and the Economy, Stanford, California.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform: *Harvard Educational Review, 57*(1), 1-22.

Tamir, P. (1988). Subject matter knowledge and related pedagogical knowledge in teacher education. *Teaching and Teacher Education, 4*, 99-110.

Taylor, P. C. & Fraser, B. J. (1991, April). *Development of an instrument for assessing constructivist learning environments*. Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Tobin, K., Kahle, J. B., & Fraser, B. J. (1990). *Windows into science classes: Problems associated with higher level cognitive learning*. London: Falmer.

Tobin, K, & Fraser, B. J. (1989). Barriers to higher cognitive learning in high school science. *Science Education, 73*, 659-682.

Tuan, H. L. (1996). Pedagogical content knowledge -- a revelation for the reform of future science teacher education. *Proceedings of the First Math and Science Teaching and Teacher Education conference* (pp. 118-143).

Tuan, H. L., Chang, H-P., Wang, K-H, & Treagust, D. F. (1997, January). *The development of a questionnaire for assessing student perceptions of teachers knowledge in Taiwan and Australia: A pilot study*. Paper presented at the International Conference on Science, Mathematics and Technology Education, Hanoi, Vietnam.

Wilson, S., Shulman, L. S., & Richert, A. (1987). "150 different ways of knowing" Representations of knowledge in teaching. In J. Calderhead (Ed.), *Exploring teacher thinking*. Sussex, England: Holt, Rinehart & Winston.

What is Happening in this Class?

Student Questionnaire 2

Directions for Students

These questionnaires contain statements about practices which could take place in this class. You will be asked how often each practice takes place.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted. Think about how well each statement describes what this class is like for you.

Draw a circle around

1	if the practice takes place	**Almost Never**
2	if the practice takes place	**Seldom**
3	if the practice takes place	**Sometimes**
4	if the practice takes place	**Often**
5	if the practice takes place	**Almost Always**

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

Your Name: _____

Teacher's Name: _____

School: _____

Grade ____ **Male** ❑ **Female** ❑

Science Class: **Biology** ❑ **Physical Science** ❑

IR		Almost Never	Seldom	Some-times	Often	Almost Always
81.	My teacher divides the whole class into small groups for teaching activities.	1	2	3	4	5
82.	My teacher's teaching methods keep me interested in science.	1	2	3	4	5
83.	My teacher provides opportunities for me to express my point of view.	1	2	3	4	5
84.	My teacher uses different teaching activities to promote my interest in learning.	1	2	3	4	5
85.	My teacher uses the same procedures to teach different topics.	1	2	3	4	5
86.	My teacher uses interesting teaching methods to teach science topics.	1	2	3	4	5
87.	My teacher's teaching methods make me think hard.	1	2	3	4	5
88.	My teacher uses a variety of teaching approaches to teach different topics.	1	2	3	4	5
89.	My teacher's lessons are the same.	1	2	3	4	5

RR		Almost Never	Seldom	Some-times	Often	Almost Always
90.	My teacher uses familiar examples to explain scientific concepts.	1	2	3	4	5
91.	My teacher uses appropriate diagrams and graphs to explain science concepts.	1	2	3	4	5
92.	My teacher uses demonstrations to show science concepts.	1	2	3	4	5
93.	My teacher uses examples with which I am familiar to help me understand science concepts.	1	2	3	4	5
94.	My teacher uses stories to explain science ideas.	1	2	3	4	5
95.	My teacher uses appropriate models to help me understand science concepts.	1	2	3	4	5
96.	My teacher shows us activities that I can use to continue my study of a topic.	1	2	3	4	5
97.	My teacher uses familiar events to describe scientific concepts.	1	2	3	4	5
98.	My teacher explains science concepts using language that I can understand.	1	2	3	4	5
99.	My teacher uses suitable films and video tapes to explain scientific concepts.	1	2	3	4	5

SMK		Almost Never	Seldom	Some-times	Often	Almost Always
100.	My teacher knows the content (s)he is teaching.	1	2	3	4	5
101.	My teacher explains science concepts clearly.	1	2	3	4	5
102.	My teacher knows how science theories or principless have been developed.	1	2	3	4	5
103.	My teacher cannot answer our questions about science concepts.	1	2	3	4	5
104.	My teacher knows the answers to questions that we ask about science concepts.	1	2	3	4	5
105.	My teacher knows how science is related to technology.	1	2	3	4	5
106.	My teacher knows the history behind science discoveries.	1	2	3	4	5
107.	My teacher explains the impact of science on society.	1	2	3	4	5
108.	My teacher does not know the content (s)he is teaching.	1	2	3	4	5

KSU		Almost Never	Seldom	Some-times	Often	Almost Always
109.	My teacher's tests evaluate my understanding of a topic.	1	2	3	4	5
110.	My teacher's questions evaluate my understanding of a topic.	1	2	3	4	5
111.	My teacher's assessment methods evaluate my understanding.	1	2	3	4	5
112.	My teacher uses different approaches (questions, discussion, etc.) to find out whether I understand.	1	2	3	4	5
113.	My teacher knows whether I understand what (s)he is teaching.	1	2	3	4	5
114.	My teacher assesses the extent to which I understand the topic.	1	2	3	4	5
115.	My teacher uses tests to check that I understand what I have learnt.	1	2	3	4	5
116.	My teacher's tests allow me to check my understanding of concepts.	1	2	3	4	5
117.	My teacher checks that I understand what is being taught.	1	2	3	4	5

BEST COPY AVAILABLE